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AUTHOR Tolley, Kimberley
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ABSTRACT

From an analysis of 16 handbooks and courses of study published between the years of 1891 to 1918, the nature study curriculum reflected an enormous agenda for reform spanning three areas: society, culture, and the environment. The curriculum included the disciplines subsumed under natural history and emphasized the investigation of natural phenomena in the local environment. The repudiation of nature study by leading science educators during the progressive era in education (1917-1957) highlights some of the ironies of this period, an era that many educators today associate with notions of experiential learning and an emphasis on science in the curriculum. The history of the nature study movement during the progressive era reveals a distinct shift away from experiential learning towards instructional methods deemed more efficient. In the thirties, advocates of the program called "elementary science" increasingly cited the textbook and demonstration method as more favorable than the field work and laboratory methods traditionally used in nature study. Ironically, as science the subject decreased in importance, educators increasingly emphasized the instrumental use of the scientific method to solve social and educational problems. (Author/LZ)

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"STUDY NATURE, NOT BOOKS:" THE NATURE STUDY CURRICULUM 1891-1932

by Kimberley Tolley
The University of California at Berkeley
Paper presented at the 1994 AERA Conference
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Abstract

From an analysis of sixteen handbooks and courses of study published between the years of 1891 to 1918, the author concludes that the nature study curriculum reflected an enormous agenda for reform, spanning three areas: society, culture, and the environment. The curriculum included the disciplines subsumed under natural history and emphasized the investigation of natural phenomena in the local environment.

The repudiation of nature study by leading science educators during the progressive era in education (1917-1957) highlights some of the ironies of this period, an era that many educators today associate with notions of experiential learning and an emphasis on science in the curriculum. The author argues that the history of the nature study movment during the progressive era reveals a distinct shift away from experiential learning towards instructional methods deemed more efficient.

In the thirties, advocates of the program called "elementary science" increasingly cited the textbook and demonstration method as more favorable than the field work and laboratory methods traditionally used in nature study. Additionally, the increased emphasis on the social studies during this period had the effect of maintaining science's marginal status in the curriculum during subsequent decades. Ironically, as science the subject decreased in importance, educators increasingly emphasized the instrumental use of the scientific method to solve social and educational problems.

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Introduction

During the mid-nineteenth century, the eminent and highly popular naturalist Louis Agassiz delivered lectures to teachers in Massachusetts. It was his habit to distribute live grasshoppers to his audience, an event that caused a great deal of excitement and enthusiasm. Each teacher had to hold a grasshopper and examine it carefully as Agassiz described its structure and habits. "Study nature, not books," was a motto ascribed to Agassiz, who exhorted his audience to take school children out into the fields and roadsides to learn about nature first hand.[1]

For fifty years or more, educational reformers used the slogan, "Study nature, not books," to argue that children should set aside their schoolbooks and learn directly from nature in the field. A reform directed at children in the first eight years of school, nature study gained widespread support at the turn of the century through the leadership at two prominent centers of influence: the pedagogically progressive community at the University of Chicago and the agricultural science community at Cornell University. Its advocates and supporting institutions included classroom teachers, both amateur and professional

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1. H.G. Good, A History of American Education. New York: Macmillan, 1956: 221-228; David Starr Jordan, Days of a Man. Yonkers-on Hudson, New York: World Book, 1922: 117-118. Jordan states that after the death of Louis Agassiz, his students wrote this motto along with several others on a cloth and hung it in the school building at Penikese Island in the summer of 1874. The cloth hung there for fifteen years until it was carried by Jordan's student Eigenmann to the Marine Station at Woods Hole.

scientists, natural history museums and societies, early conservation groups, state bureaus of agriculture, Teachers College, Columbia, the universities of Clark and Chicago, and such land grant colleges as Cornell and Purdue. Nature study handbooks and courses of study were published by every major educational publishing company in the country.[1]

During the progressive era in education, nature study was harshly repudiated by prominent science educators. In their efforts to replace nature study with the program described as "elementary science," such writers as Ralph S. Powers and Gordon Craig of Teachers College, Columbia, accused nature study advocates of sentimentalism and Romanticism. Cited numerous times in the science education literature during subsequent decades, their rhetorical portrayal of nature study has served as a lingering veil of distortion over the movement.[2]

With the exception of several unpublished dissertations, the nature study movement has received little attention in histories

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1. Otis W. Caldwell and Florence Weller, "The Nature Study and Elementary Science Movement," in School Science and Mathematics, vol. 33, 1932: pp. 730-740; Orra E. Underhill, The Origins and Development of Elementary School Science. (Chicago: Scott, Foresman and Co., 1941); Monroe, Paul (Ed.) "Nature Study," in Cyclopedia of Education. New York: Macmillan, 1913: pp. 389-391.

2. Craig, G.S., "The Program of Science in the Elementary School," in National Society for the Study of Education Thirty-First Yearbook. Part I. (Bloomington, Illinois: Public School Publishing Company, 1932); Powers, Ralph S., "Some Criticisms of Current Practices in the Teaching of Science in Elementary and Secondary Schools," in National Society for the Study of Education Thirty-First Yearbook. Part I.; Powers, Ralph S., "Preface," in Orra Underhill's The Origins and Development of Elementary School Science.

of science education. An investigation and analysis of the nature study movement is long overdue. In focusing on the one or two facets of nature study that bear on his or her topic, most historians have incidentally provided a one-dimensional treatment of the movement. In the research literature, nature study has been variously characterized as a progressive movement in pedagogy, as the prototype of environmental education, as an outgrowth of Romanticism, as the legacy of amateur botany, as a feature of the back-to-nature arcadian movement in the late nineteenth century, or as the result of the efforts of nineteenth century scientists and institute lecturers to include natural history in the curriculum of the common schools.[1]

This study aims to answer the following questions: 1) what were the stated aims of nature study? 2) What was nature study,

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1. Cremin, Lawrence, The Transformation of the School: Progressivism in American Education, 1876-1957. (New York: Vintage, 1961) Cremin includes nature study in his discussion of reforms during the preliminary phase of the progressive movement, a phase he terms "the progressive impulse."; Minton, Tyree, "The History of the Nature-Study Movement and Its Role in the Development of Environmental Education." Ph.D. diss. (University of Massachusetts, 1980) Minton concludes that the nature study curriculum was proto-environmental; Orra Underhill, The Origins and Development of Elementary School Science Underhill's work is quoted in many histories of science education during subsequent decades. A proponent of the new program termed "elementary science, Underhill considered nature study to be an unfortunate digression in the history of science education; Elizabeth Keeney, The Botanizers. (Chapel Hill: The University of North Carolina Press, 1992) Keeney devotes a final chapter to the nature study movement, arguing that amateur naturalists promoted the movement; Schmitt, Peter J. Back to Nature: The Arcadian Myth in Urban America. (New York: Oxford University Press, 1969); H.G. Good, A History of American Education. For Schmitt, the nature study movement was the outgrowth of a back-to-nature movement in late nineteenth century America.

as evidenced by the content of its curriculum? and 3) What was the relation of nature study to the larger progressive movement in pedagogy?

Methodology

The central artifacts used in this investigation are sixteen nature study handbooks and courses of study published between the years of 1891 and 1932. This sample of 16 handbooks and courses of study represents 42% of all such published materials identified by the author to date.

For the purposes of this study, a handbook is defined as "a text for teachers containing information about the aims, principles, and methods of nature study." A course of study is defined as "a graded or ungraded sequential curriculum." Many of the texts included in this study are a combination of both handbook and course of study.

The authors represented here included eminent educators and scientists, as well as one of the first female professors in the United States. Acknowledged by contemporaries as leaders of the nature study movement, they were teachers at normal schools, private universities, land grant colleges, and public schools. The authors and their positions are represented in Table 1.

Table 1

Author	Professional Institution	Position
Liberty Hyde Bailey	Cornell University	Professor of Horticulture
Anna Comstock	Cornell University	Professor of Nature Study
John G. Coulter	Illinois State Normal University	Instructor of Biology
John M. Coulter	University of Chicago	Professor of Botany
Stanley Coulter	Purdue University	Professor of Biology
Horace H. Cummings	Utah State Normal Normal School	Supervisor of Nature Study
Elliot R. Downing	University of Chicago	Assoc. Professor of Science Instr.
Clifton F. Hodge	Clark University	Asst. Professor of Biology
Frederick L. Holtz	Brooklyn Training School for Teachers	Head of Nature Study
Wilbur S. Jackman	University of Chicago	Professor of Nature Study
Alice J. Patterson	Illinois State Normal University	Instructor of Nature Study
D. Lange	St. Paul, Minnesota	Public School Instructor
Francis E. Lloyd	Teachers College Columbia University	Adjunct Professor of Biology
Charles A. McMurry	Illinois State Normal University	Professor of Education
Charles B. Scott	Oswego State Normal School	Instructor in Nature Study
Samuel C. Schmucker	West Chester State Normal School	Professor of Biology

The Nature Study Curriculum: Content and Characteristics

In contrast to the humanities, whose "subjects were drawn from the interrelations of men," nature study took its subjects from nature: the interrelations of earth, air, sky, water, and life.[1] The curriculum of the handbooks and courses of study examined here included the disciplines subsumed under natural history, particularly the topics of botany and zoology, as shown in Table 3.

Table 3
Percentage of Texts Offering Various Subjects

Subject	Percentage of Texts Including
Botany	100
Zoology	100
Geology/Mineralogy	86
Meteorology	62
Astronomy	54
Physics	54
Agriculture	23
Chemistry	8

Experiential

All of the authors wrote their lessons and courses of study as guides to the observation of natural phenomena. The prefaces of these texts abound with exhortations to avoid textbook learning and to encourage students to learn directly from nature,

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1. Jackman, Wilbur S., "Nature Study," in The Third Yearbook of the National Society for the Scientific Study of Education. Chicago: The University of Chicago Press, 1904: 73.

preferably in the field rather than in the classroom.[1] Because the majority of texts included questions to guide the observation of natural phenomena, they would have been useless to the teacher who hoped to teach from the text alone, as illustrated by the following example:

> In what position is the snake when it rests? Can you see how it moves? Look upon the lower side. Can you see the little plates extending crosswise?[2]

Environmental

Nature study was generally environmental, emphasizing such topics as life histories, evolution, adaptation, and the distribution of species. Several authors, such as D. Lange, took ecosystems as subjects for their lessons, while the majority stressed environmental factors influencing such single organisms as the dragonfly or dandelion.

Such leaders of the nature study movement as Wilbur S. Jackman, Liberty Hyde Bailey, and Anna Botsford Comstock were thoroughly Darwinian in outlook, as was the generation of

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1. For example, see Charles A. McMurry, A Special Method in Science for the First Four Grades of the Common School. Bloomington, Illinois, Public School Publishing Company, 1896: 7-12; Purdue Nature Study Leaflets. Lafayette, Indiana: Purdue University, 1898: 2,5; Samuel Christian Schmucker, The Study of Nature. Philadelphia: J.B. Lippincott, 1909: 17, 22-24; Charles B. Scott, Nature Study and the Child. Boston: D.C. Heath & Col, 1900: 97; Frederick L. Holtz, Nature Study, a Manual for Teachers and Students. New York: Charles Scribner's Sons, 1908: 24; Horace Hall Cummings. Nature Study by Grades. New York: American Book Company, 1908: 11.

2. Anna Botsford Comstock, Handbook of Nature Study. Ithaca, New York: Comstock Publishing Company, 1911: 203.

naturalists that rose to prominence after the publication of Darwin's The Origin of Species. Darwin had opened the door to the study of living organisms in their natural environment, evoking ecological thinking with the last paragraph of the Origin, in which he described "an entangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth...dependent upon each other in so complex a manner." [1] Similar statements can be found in many nature study texts, as illustrated in the language of Wilbur S. Jackman, one of nature study's preeminent theorists:

> The delicacy of the balance that exists among the parts of the landscape is scarcely exceeded by the sensitiveness of the poise maintained by the organs of the living body. The slightest change anywhere is sufficient to destroy the balance abruptly and cause a readjustment of all the adjacent parts.[2]

Some later writers portrayed nature study as a kind of object teaching,[3] but nature study differed qualitatively both in matter and in method from the object teaching it replaced and from the elementary science that succeeded it. The Nature Study Review defined nature study as "the simple observational study of

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1. Quoted in Lynn Barber's The Heyday of Natural History 1820-1870 London: Jonathan Cape, 1980: 287.

2. Jackman, 1904: 23.

3. For example, Orra Underhill, The Origins and Development of Elementary-School Science. Chicago: Scott, Foresman and Co., 1941; Paul DeHart Hurd and James Joseph Gallagher, New Directions in Elementary Science Teaching. Belmont, California: Wadsworth Publishing, 1968.

common natural objects just because they are interesting." The term "simple observation" was used here to distinguish nature study from what was perceived to be the extreme formalism associated with the science textbooks of that period. The term "common natural objects" is misleading in the sense that it evokes the idea of object teaching, in which such unrelated things as an egg, a piece of glass, or a leaf formed the subjects of study. The usual objects of nature study, as evidenced in the courses of study examined here, were plants and animals as they existed in their natural habitats.[1]

Child-Centered

Sources contemporary with the nature study movement depicted nature study as an educational program of natural history based on the child's interests and environment. In 1913, Paul Monroe's Cyclopedia of Education noted that there existed no sharp distinction between nature study and science, and pointed out that the nature study curriculum was increasingly devoted to the study of both physical and biological science. Otis Caldwell, professor of Education at Teachers College, Columbia and director of its Lincoln School, had served on the organizing committee for the American Nature Study Society in 1908. Caldwell and Weller depicted nature study as a child-centered version of natural history in which the curriculum was usually organized around the general principles of biological science.[2]

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1. Good, pp. 221-222.

2. Monroe, pp. 389-391; Caldwell and Weller, pp. 730-740.

At least one prominent nature study author was associated with the increasingly controversial culture epoch theory of the psychologist G. Stanley Hall. Hall wrote the introduction to the Clifton F. Hodge's Nature Study and Life. Hodge was a professor of biology at Clark University and a close colleague of Hall. In the introduction to Hodge's book, Hall explains the suitability of nature study for younger children on the basis of epochs in child development:

> Rock forms, crystals, stars, weather, and seasons are all interesting, but have their nascent period later, and at this stage pale before the deep, instinctive love of pets and the fauna and flora of the immediate environment.[1]

In contrast to Hodge, such leaders as Jackman, Bailey, and Comstock never accepted Hall's culture epoch theory, emphasizing instead the obvious developmental differences between children and adults. In her discussion of the relation of nature study to science, Anna Comstock argued that nature study was "perfectly good science within its limits, but it is not means to be more profound or comprehensive than the capabilities of the child's mind." For Comstock, the content of nature study covered the same areas as the science students would study later in life, but

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1. Clifton F. Hodge, Nature Study and Life. Boston: Ginn & Co., 1902: preface. For a discussion of G. Stanley Hall's theories and their eventual repudiation by the education community, see Herbert M. Kliebard's The Struggle for the American Curriculum 1893-1958. New York: Routledge, 1986: 30-58.

in less depth:

> To illustrate: If we are teaching the science of ornithology, we take first the Archaeopteryx, then the swimming and the scratching birds and finally reach the song birds, studying each as a part of the whole. Nature-study begins with the robin because the child sees it and is interested in it and he notes the things about the habits and appearance of the robin that may be perceived by intimate observation.[1]

Integrated

Several educational leaders, such as Col. Francis Parker and Wilbur S. Jackman of the University of Chicago, went so far as to recommend unifying the curriculum around nature study.[2] This was consistent with a view of curriculum unity called "concentration," popular in the early progressive education movement. Thus, literature related to nature topics and the poetry of such writers as Wordsworth, Emerson, and Lowell were included in many courses of study, along with occasional topics relating to geography and history. Art and manual training were integrated with nature study through such activities as illustration, landscape painting, and the construction of bird houses or weather vanes.[3] Nature study authors encouraged students to keep

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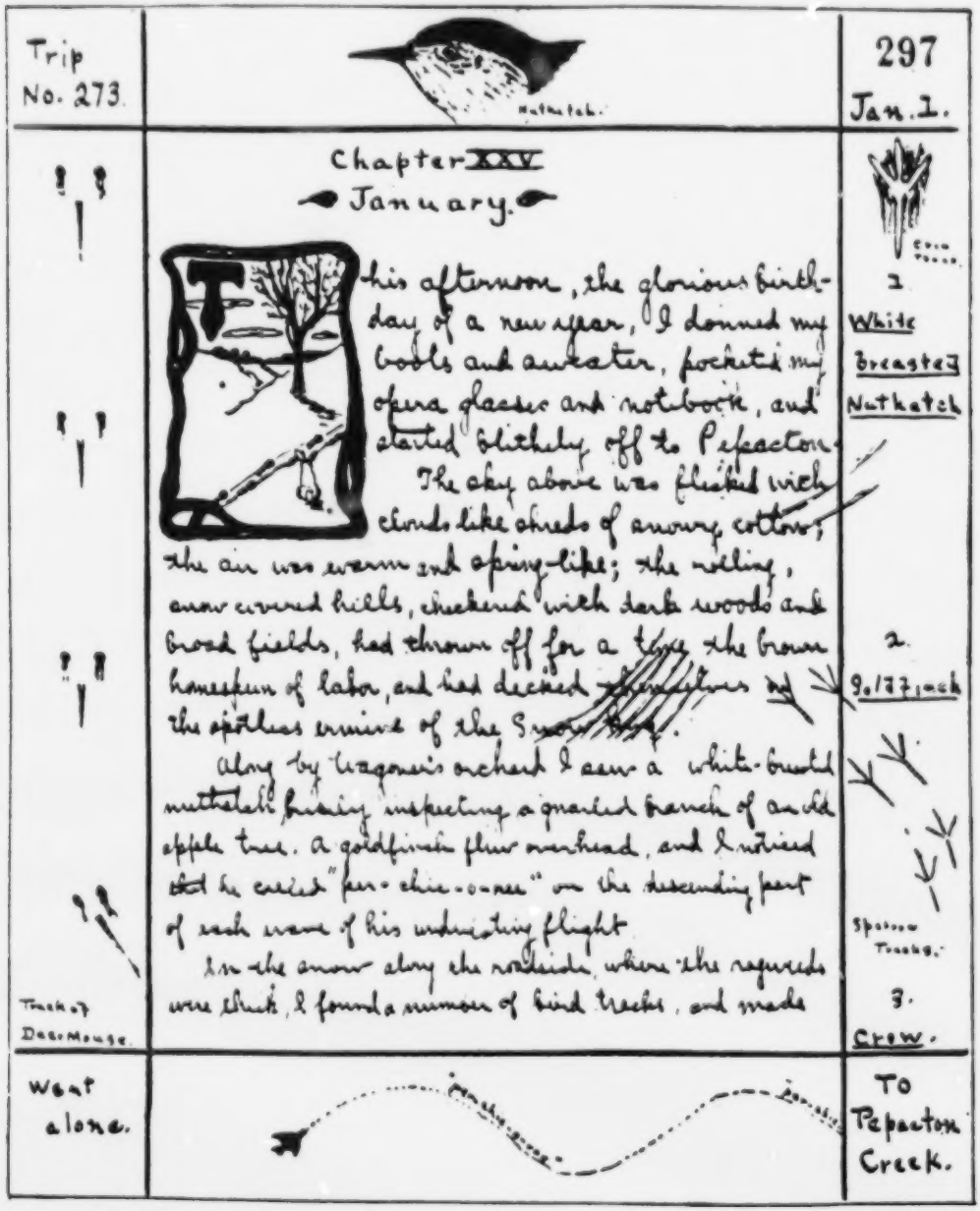
1. Comstock, p. 5.

2. For a discussion of Col. Francis Parker's views about integrating the curriculum around science, see Ellwood Cubberley, Public Education in the United States. Boston: Houghton Mifflin, 1919: 471ff; Jackman, 1904.

3. Jackman 1904: 42ff, 50ff; Comstock, pp. 16ff; Purdue, p. 1; Scott, p. 109; Holtz, p. 5; Cummings, pp. 24ff; Schmucker p. 32; Elizabeth Carss, "Course in Nature-Study," in Teachers College Record Vol. 1, New York: Columbia University Press, 1900 (See also the course in manual training in the same volume.)

a field notebook or journal throughout the year, as illustrated in the sample provided by Anna Comstock in Figure 1.

Figure 1


Trip No. 273.
297
Jan. 1.
Chapter XXV
January.
This afternoon, the glorious birthday of a new year, I donned my boots and sweater, pocketed my opera glasses and notebook, and started blithely off to Pepacton.
The sky above was flecked with clouds like shreds of snowy cotton; the air was warm and spring-like; the rolling, snow covered hills, checkered with dark woods and broad fields, had thrown off for a time the brown homespun of labor, and had decked themselves in the spotless ermine of the season.
Along by Wagner's orchard I saw a white-breasted nuthatch busily inspecting a gnarled branch of an old apple tree. A goldfinch flew overhead, and I noticed that he called "per-chic-o-ree" on the descending part of each wave of his undulating flight.
In the snow along the roadside, where the rye reeds were thick, I found a number of bird tracks, and made
1
White Breasted Nuthatch
2.
9.177; each
Sparrow Tracks.
3.
Crow.
Track of Deer Mouse
Went alone.
To Pepacton Creek.

A page from the field note-book of a lad of fourteen who read Thoreau and admired the books of Thompson-Seton.

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Controversial Elements

During the late twenties and thirties, opponents of nature study argued that the curriculum was laced with religion and anthropomorphism, and this view of nature study prevailed well into the sixties. However, an analysis of the nature study curriculum represented in this sample yields the conclusion that such charges, at least in regards to published handbooks and courses of study, were greatly exaggerated.

Vestiges of natural theology, the eighteenth-century view that God is revealed in the natural world, was found in a minority of the texts sampled. 31% of the texts included one or two statements of natural theology in their prefaces.[1] With one exception, such statements remained within the bounds of the prefaces, never straying into the lessons or courses of study. Only once did Charles B. Scott of Oswego Normal School include a statement of natural theology within the context of a lesson, concluding a lesson on the dandelion with the following:

> Everything about [the dandelion] points to its Source. It is one of those living pages of God's book, a leaf in the manuscript of God.[2]

Anthropormorphic statements, such as the one below, were the exception rather than the rule in this sample:

> If ever fog or storm hides the earth from [the gander's] view, he is likely to become confused, to

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1. Cummings, p. 21; Hodge, p. 31; Holtz, p. 1908; Schmucker, pp. 9, 41; Scott, pp. 32, 100.

2. Scott, p. 37.

> the dismay of his flock, which follows him to the earth with many lonely and distressful cries.[1]

The issue of anthropomorphism was addressed by several authors in the texts of their prefaces. Along with his fellow authors, the eminent botanist John Coulter decried the practice of anthropomorphizing animals in nature stories. On the other hand, the Herbartian Charles McMurry defended the practice. According to McMurry, anthropomorphism was an acceptable means by which primary teachers sought to make the material accessible to younger students.[2]

Aims of The Curriculum

The authors of the nature study curriculum represented in this sample had an enormous agenda for reform, spanning three areas: society, culture, and the environment. Table 2 lists the aims most commonly stated in the prefaces of fifteen texts.

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1. Comstock, p. 139.

2. John M. Coulter, John G. Coulter, and Alice Jean Patterson, Practical Nature Study and Elementary Agriculture. New York: D. Appleton and Company, 1909: pp. 34-40; McMurry, pp. 59-65.

Table 2

Percentage of Authors Stating Various Aims for Nature Study in Fifteen Texts*

Aims	Percentage
To develop observation skills	67
To integrate the curriculum	67
To create an appreciation of natural beauty	67
To increase scientific knowledge	60
To improve agricultural skills	53
To build moral character	47
To provide practical preparation for life	40
To encourage conservation	33

* All but one author stated several aims; therefore, the total of the percentages exceeds 100. One author, D. Lange, stated no aims in his collection of nature study lessons. His text is therefore not included in this sample.

Social Reform

Rising to prominence on the heels of one of the worst agricultural depressions ever experienced in the Eastern United States, nature study writers aimed to improve the physical quality of life in rural areas by improving the agricultural skills and scientific knowledge of the population.[1] The state of agriculture became an intense social concern near the end of the nineteenth century during the agricultural depression of 1891-1893. During these years, the various philanthropic organizations of New York City became overburdened attempting to assist the many people who flocked to the city from the rural districts. According to Anna Comstock, later Professor of Nature Study at Cornell University, the Association for Immproving the Condition of the Poor asked, "What is the matter with the land of New York State that it cannot support its own population?" As a result of the deliberations of the Committee for the Promotion of Agriculture in New York State, in 1894 the State of New York gave an appropriation to Cornell University to promote agriculture. This appropriation went to form the Bureau of Nature Study in the Department of Agriculture at Cornell.[2]

The preface to the Cornell Nature Study Leaflets, written by Liberty Hyde Bailey, explained that the general purposes of the leaflets were to "create a larger public sentiment in favor of

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1. See Purdue, p. 4; Hodge, pp. 10ff; Jackman, 1904: 30ff; Cornell Nature-Study Leaflets. (Ithaca, New York: Cornell University, 1904): 15; Holtz, p. 4; Cummings, p. 12; Coulter, Coulter, and Patterson, pp. 2ff; Comstock, p. 21.

2. Comstock, preface.

agriculture, [and] and to increase the farmer's respect for his own business." The leaflets themselves did not explicitly teach technical agriculture, but rather focused on the process of careful observation based on the child's natural environment.[1]

Wilbur S. Jackman, later Dean of the School of Education at the University of Chicago, emphasized the importance of nature study in helping farmers to observe carefully the natural features of their farms. According to Jackman, many instances of poor farming were due to the fact that farmers were unfamiliar with the interrelations of temperature, topography, moisture, soil, and agriculture. The role of nature study was to train the future farmer in the scientific investigation of natural conditions:

> In short, all the rural occupations of agriculture, horticulture, and grazing should be determined upon beforehand by a scientific investigation of natural conditions...the infinite social and physical discomforts of country life, will not be relieved until people are recreated by that rational study of nature which it is the function of nature-study in the schools to stimulate and direct.[2]

Cultural Reform

Nature study advocates aimed to improve the aesthetic quality of life for Americans from all classes of society. Several authors claimed that while the visual arts were accessible only to the elites in society, nature was accessible

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1. Cornell Nature-Study Leaflets: 16.

2. Jackman, 1904: 30.

to all.[1]

Of the writers surveyed, Samuel C. Schmucker, a professor of biology at West Chester State Normal School, placed the greatest emphasis on the relation of nature study to culture. He argued that the worthy goals of high culture, as expressed through literature, art, and music, are accessible only to the elites in society. His argument aimed to justify nature study as the vehicle for promoting culture to all classes of society:

> When once our population becomes so divided as to form itself into the cultured and the uncultured, into those to whom life shall be filled with meaning and to those to whom life is a continual grind, the line of demarcation is a terrible barrier...If culture is to come into these lives it must come by an entirely different path [2]

By identifying enjoyment and appreciation of beauty as the vehicle of culture, Schmucker and other nature study writers were able to argue that nature study, by encouraging an appreciation of the beauties of nature, thereby brings culture into children's lives. The strongest version of this statement was made by Schmucker in the passage below:

> [The student's] toil may, and his leisure must, bring him face to face with the rocks and trees, the birds and insects, the flowers and the fruits, the clouds and

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1. Wilbur S. Jackman, Nature Study for the Common Schools. (New York: Henry Holt & Co., 1894): 7ff; McMurry, p. 48; Scott, pp. 30, 113; Hodge, pp. 20ff; Jackman, 1904: 49; Cornell, p. 19; Holtz, p. 6; Schmucker, pp. 9, 39; Coulter, Coulter, and Patterson, pp. 16, 26; Comstock, p. 1.

2. Schmucker, pp. 36-37.

> the rain, the moon and the stars; from their presence he cannot escape if he would. Books he may lack the means or disposition to buy; good pictures he may never see; music, beyond that of ragtime, may make little appeal to him; but the landscape is ever with him, and if he learned in his early life to know and love, to take interest in, and to care for, his surroundings, then he will have a source of possible culture that will stay with him, without undue effort and without cost, for the rest of his life.[1]

Of the sixteen texts surveyed, eleven made similar esthetic claims, usually taking the briefer form as stated by McMurry:

> The esthetic phases of nature's handiwork, the beauty of form, color, and proportion in the flower, bird, insect, cloud, mountain, etc., furnish limitless and constant opportunities for esthetic appreciation and culture. Many think this the choicest part of nature study.[2]

Environmental Reform

The advent of Darwinism marked a profound shift in attitudes toward nature. Scientists realized that the survival of a species was intimately dependent on the survival of its environment. It was not enough to prevent people from killing species, it was now necessary to conserve entire habitats. Several nature study writers emphasized the human species as but one species among many, dependent like all the others on the maintenance of a fragile harmony in nature.[3]

Nature study writers aimed to teach students to respect the

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1. ibid, p. 39.

2. McMurry, p. 49.

3. This emphasis is particularly strong in the writings of Wilbur S. Jackman, Charles B. Scott, and Frederick L. Holtz.

natural environment and to conserve natural resources. For example, Charles Scott of the Oswego Normal School concluded a sample lesson on the dandelion with the claim that the dandelion "may minister to the ethical nature of the child--and of his teacher" by providing an example of ecological adaptation by which "boys and girls can better appreciate what they [themselves] receive from their environment, and what they owe to it." [1] Scott emphasized the damage done by humans to their natural environment:

> We have adapted ourselves to our physical environment by stripping our land of its forests, our air of its birds, our waters of their fish, by using up in the most reckless manner our natural resources. Nature has been our slave, from whom we could take anything, to whom we owed nothing.[2]

Scott's aim was to teach children a kind of ethics of adaptation, so that, like the dandelion, they might learn to give back to the environment what they had taken.

The Repudiation of Nature Study During the Progressive Era in Education

The aims and goals of nature study place it squarely within the first phase of progressive education, a phase Lawrence Cremin labeled "the progressive impulse" and identified with the period from 1876-1917. According to Cremin, this phase was marked by a rising concern with pedagogical and social reform. The

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1. Scott, p. 34.
2. Scott, p. 123.

publication dates of the handbooks and courses of study examined here, which range from 1891 to 1918, virtually all fall within this period.[1]

Nature study was repudiated by a group of leading science educators during the twenties and thirties. In the landmark Thirty-First Yearbook for the Study of Education, Ralph S. Powers of Teacher's College, Columbia, announced that the term "nature study" was being dropped in "references to courses in science for the elementary schools." Orra Underhill, writing in 1941, reported that the previous term "nature study" was being replaced by the term "elementary science" even in kindergarten. [2]

There were many factors influencing the rejection of nature study, of which four should be mentioned briefly. First, the devastating impact of the World War I on the school garden movement contributed to the demise of school gardening across the country, an important component of many school districts' nature study programs.

A second probable factor in the decline of nature study was the waning interest in Darwin's theory of natural selection. The biological community's increasing interest in mutation theory as an explanation of the evolution of life on earth accompanied a decreasing interest in fieldwork to investigate the selective power in the environment. During the first decades of the

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1. Lawrence A. Cremin, The Transformation of the School: Progressivism in American Education, 1876-1957. New York. Vintage, 1961.

2. Powers, p. 16; Underhill, p. 219.

twentieth century, the professional biologist in the laboratory emerged in contrast to the naturalist in the field, who was more often than not an amateur, and often female at that.[1]

A third blow to nature study was the decreasing emphasis on the sciences during the later phase of the progressive era. Following the lead of Colonel Francis W. Parker, nature study advocate Wilbur S. Jackman had sought to unify the curriculum around science. Taking a different approach, Charles B. Scott had argued for two centers around which the curriculum might be unified: the social world and the natural world. For Scott, students needed to learn about the social world in order to realize their responsibility to their fellow citizens; they needed to learn about the natural world in order to realize their responsibility to their natural environment. Opponents of nature study followed the lead of John Dewey, who argued that nature study could never be the center of the curriculum. For Dewey, the study of science had instrumental value only insofar as the methods of science could be applied to solving the problems of social life. Dewey repudiated the ecological perspective inherent in nature study:

> I believe that education cannot be unified in the study of science, or so-called nature study, because apart from human activity, nature itself is not a unity; nature in itself is a number of diverse objects in space and time, and to attempt

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1. David A. Ward, "The Future of School Gardens," in National Education Association Journal 16, 1927, pp. 71-72; Peter J. Bowler, Evolution: The History of an Idea. Berkeley: University of California Press, 1989, pp. 246-270. Bowler terms this period "the eclipse of Darwinism."

> to make it the centre of work by itself, is to introduce a principle of radiation rather than that of concentration.[1]

During the progressive era at Teachers College, Columbia, educators increasingly rejected science as a unifying topic for the curriculum while embracing the scientific study of education. The increased emphasis on the social studies, rather on the sciences, had the effect of maintaining science's marginal status in the curriculum during subsequent decades.[2]

A fourth factor in the rejection of nature study can be found in the emerging body of research into those methods of instruction presumed most efficient in science education further undermined support for field and laboratory methods. Citing contemporary research studies, science educators during the twenties and thirties recommended the demonstration method as a less time-consuming means of teaching than the cumbersome laboratory method.[3] In their attempts to dislodge nature study from the public schools, science educators decried its dependence on learning in the field. In the landmark Thirty-First Yearbook of the Society for the Study of Education, Gordon Craig lamented Louis Agassiz's exhortation to study nature directly:

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1. John Dewey, "My Pedagogic Creed," in John Dewey the Early Works, 1882-1898. Carbondale: Southern Illinois University Press.

2. For a very brief discussion of the failure of science education to assume a central position in the studies of American youth, see George E. DeBoer, A History of Ideas in Science Education. New York: Teachers College Press, pp. 215-216.

3. See discussion in "Isues in the Teaching of Science," in the Forty-Sixth Yearbook of the National Society for the Study of Education. Chicago: University of Chicago Press, 1947, pp. 53-54.

> Great emphasis upon Agassiz's advice to study nature, not books, as the essential method of nature study has been at times unfortunate.[1]

A new emphasis on textbook learning eventually replaced the earlier rejection of textbooks in favor of learning in the field: New textbooks for the study of elementary science were produced by many educational publishers during the thirties, and the next several decades would see an enormous increase in the publication and dissemination of science textbooks throughout the schools.[2]

Conclusion

Educators often associate the progressive era in education (1917-1957) with notions of experiential learning and an emphasis on science in the curriculum. However, the history of the nature study movement during this period reveals a distinct shift away from experience towards efficiency, and a decreasing emphasis on the subject of science in favor of the instrumental use of the scientific method to solve social problems.

Ironically, reformers in science education during the fifties and sixties would look back on the previous two decades, shaped largely by educators identified with the progressive movement at Teachers College, Columbia, as a textbook-driven wasteland.

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1. Gordon S. Craig, "The Program of Science in the Elementary School," in National Society for the Study of Education Thirty-First Yearbook, Part 1. Bloomington, Illinois: Public School Publishing Company, 1932: 145.

2. Underhill, p. 220.

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